

ITS4US ConOps Training Session Transcript (03-16-21)

Deb Curtis

As you may remember, I am Deb Curtis.

Deb Curtis

I am a highway research engineer from the Office of Operations Research and Development, and I will be your systems engineering, federal USDOT lead for this project.

Deb Curtis

Next slide, please.

Deb Curtis

Next slide, please.

Deb Curtis

So, this is the agenda for our training today.

Deb Curtis

I have a few slides on the overall ITS for US program and then we're going to jump into tough two concept of operations will cover several items about the deliverable, including a brief overview, current system, environment justification for a nature of change.

Deb Curtis

This concept for proposed environment operational scenarios summary of impacts analysis of proposed system and before we finish, we'll have collected a list of useful resources and finally, how you can stay connected to us.

Deb Curtis

Next slide please.

Deb Curtis

So, let's take just a few minutes to review the program.

Deb Curtis

Although most of you are already familiar with it, next slide.

Deb Curtis

This is a very high-level summary of the complete trip ITS4US program.

Deb Curtis

It's intended to be brief, as many of you are already familiar with it, there are multiple partners involved with this initiative, with the goal of deploying innovative and integrated trips to support mobility for all users with a particular focus.

Deb Curtis

Underserved communities next life.

Deb Curtis

So, these are the five overarching program goals that we have spur, high impact, integrated, complete trip deployments nationwide identify needs and challenges by particular populations.

Deb Curtis

Develop and deploy mobility solutions that meet user needs.

Deb Curtis

Measure impact of integrated deployments and identify replicable solutions and disseminate the lessons learned.

Deb Curtis

The systems engineering process that we'll talk about today is critical to us.

Deb Curtis

Meeting all of these goals.

Deb Curtis

Next slide, please.

Deb Curtis

The USDOT awarded five teams with Phase One funding to support the development of their deployment concepts and those sites include all of you.

Deb Curtis

University of Washington, California Association of Coordinated Transportation.

Deb Curtis

Heart of Iowa regional agency.

Deb Curtis

ICF International, incorporated.

Deb Curtis

Every plan to regional Commission. So, as you can see, we have a broad group that covers a large cross section of the US next slide, please.

Deb Curtis

So, these are the deployment phases of the project.

Deb Curtis

Overall, there are three phases, and one post deployment phase participants are currently in the first phase.

Deb Curtis

Concept development will develop their ideas and ensure.

Deb Curtis

Well then.

Deb Curtis

Our future success through their concept development in later phases will test and evaluate their projects.

Deb Curtis

The deployments are expected to sustain operation for at least five years after the program is completed.

Deb Curtis

Next slide please.

Deb Curtis

Alright, so with that brief overview.

Deb Curtis

Let's go ahead and get started on what we're here for today.

Deb Curtis

The concept of Operations, document development.

Deb Curtis

Next slide please.

Deb Curtis

The concept of operations or conops template will help you to refine and improve your proposed deployment concept and to document this in a complete trip deployment.

Deb Curtis

Concept of operations which will be following the IEEE guidance.

Deb Curtis

This document will refine the needs through stakeholder engagement and guide the deployment defining key performance measures that will be used for evaluating the success of the system deployment.

Deb Curtis

Defining the existing environment and system and providing high level descriptions.

Deb Curtis

Of the enabled technologies that you plan to deploy.

Deb Curtis

Next slide, please.

Deb Curtis

So, this is a brief description of what's included under the concept of operations or conops task.

Deb Curtis

There are several documents and two activities in particular under this task.

Deb Curtis

Just a few things to note.

Deb Curtis

The draft and final stakeholder conops review panel roster should reference the stakeholder registry that you developed in task one and the draft and final of this are due April 19th and May 3rd, respectively.

Deb Curtis

The draft and final need summary are also due.

Deb Curtis

April 19th and May 3rd.

Deb Curtis

Right?

Deb Curtis

And we're going to.

Deb Curtis

And we're going.

Deb Curtis

Try to take an opportunity during our roundtable just prior to those delivery dates to touch base with you all to see if you have any questions and anything that we can help you with prior to the due date for those particular deliverables.

Deb Curtis

The draft conops and Conops walkthrough briefing deck are due May 24th.

Deb Curtis

And then the kind of comment Resolution report that it will be due on June 7th and this is what we'll use during the walkthrough to document any changes that you make to your proposed user needs.

Deb Curtis

As your stakeholders discuss them.

Deb Curtis

The final conops and Conops Comment Resolution report are due June 20.

Deb Curtis

And then with the acceptance of those final comment's documents, you were to conduct a public web and arm describing the deployment concept and that would be planned for a scheduled around the week of July 19th.

Deb Curtis

Now with five of you were going to have to do some shuffling to make sure.

Deb Curtis

That we all get it done within time, but we are also able to learn from and participate in others if we so desire to do so.

Deb Curtis

Next slide, please.

Deb Curtis

So, the Contacts has eight major components and they're described here, so the scope.

Deb Curtis

Is to provide an overview of the conops two and within the system to which it applies, so your Contacts is going to contain information about the current situation or the OR what's known as your existing system.

Deb Curtis

Also, the justification or need for change why the existing system is not sufficient.

Deb Curtis

And the concept for your proposed system.

Deb Curtis

A context diagram is very helpful to convey a logical view of the system and the actors interfacing with your proposed system.

Deb Curtis

That's particularly useful when you are talking to end users or non-technical stakeholders.

Deb Curtis

The user needs are described and operational scenarios or use cases are provided to describe how the proposed system should operate.

Deb Curtis

Section 2 lists your reference documents, and these are the documents that you will be referring to within the concept of operations.

Deb Curtis

We won't talk much more about that because it's fairly self-explanatory.

Deb Curtis

Section 3 your current in system.

Deb Curtis

An environment describes the system that you already have and the operational environment that exists, including problems that motivated the development of the new system or capability.

Deb Curtis

Thus.

Deb Curtis

You should include a context diagram of the current system or situation.

Deb Curtis

In this section.

Deb Curtis

Section 4 justification for a nature of change should describe the shortcomings of the current situation or the justification for why you want to make the changes you're proposing.

Deb Curtis

The user needs are identified and described here, and this is critical.

Deb Curtis

This section bridges the gap between sections 3.

Deb Curtis

Which is your current system and Section 5, which is your proposed system.

Deb Curtis

So, in Section 5, you're proposing the description of your concept for your proposed system, you should describe your new and proposed system based on your justification for change in user needs, you should.

Deb Curtis

Again, include a context diagram of the proposed system.

Deb Curtis

So, section 6.

Deb Curtis

Which are your operational scenarios should document the operational scenarios which are also called use cases for your new system.

Deb Curtis

The purpose of the use cases is to describe how the proposed system should operate and interact with users and external interfaces for a given set of.

Deb Curtis

Answers if you're doing agile, these will fill out these user stories can be used to populate the use cases can be used to populate user stories in your backlog.

Deb Curtis

So, Section 7 is a summary of your impacts.

Deb Curtis

You need to summarize what are the anticipated operational impacts of your new system.

Deb Curtis

On users, developers, maintainers or other stakeholders that you've identified.

Deb Curtis

And finally in Section 8.

Deb Curtis

You should provide a summary of the proposed system benefits, limitations, advantages and disadvantages, and the alternatives that you've considered.

Deb Curtis

And if we do all of these well, we'll have a comprehensive document that will provide the foundation for how we move from our proposed concept to a deployable solution.

Deb Curtis

Next slide, please.

Deb Curtis

So, this should be familiar.

Deb Curtis

This is the schedule for all the tasks and their deliverables within the with the concept of operations highlighted within the overall I TS for US contract program.

Deb Curtis

The conops effort begins part way through task 1B, which is your UN IRP development.

Deb Curtis

Several other tasks and deliverables.

Deb Curtis

Again, after the call.

Deb Curtis

Again.

Deb Curtis

After the Conops have started, such as Performance measurement, institutional partnerships and financial plans.

Deb Curtis

But it is to note again that task 6 system requirements does not begin until the concept of operations is completed.

Deb Curtis

Next slide, please.

Deb Curtis

This diagram shows how the concept of operation relates to other key deliverables within the project.

Deb Curtis

For inputs we have the systems engineering planning that you were doing currently in task 1B. The UNIRP, specifically, we're referring to the user needs identification plan that you were currently preparing.

Deb Curtis

For outputs, we have six deliverables where the conops will be used to document the operational concept required for each of these deliverables, so as.

Deb Curtis

You can see.

Deb Curtis

This is an integral part of what you're doing here within the project.

Deb Curtis

Next slide please.

Deb Curtis

This slide is a review of what we went over on Slide 11, so I'm not going to go over all of it with you, but important to note here, USDOT is strongly encouraging all sites to use the USDOT provided deliverable template. Because of the number of sites, five of you.

Deb Curtis

USDOT encourages you to use the same template.

Deb Curtis

This will make for efficient use of USDOT and Technical Support.

Deb Curtis

Contractor reviewer time and faster.

Deb Curtis

Return of comments to your sites.

Deb Curtis

The templates are here to ensure that you are including all of the information that UFCOT requires, and as a bonus, they're also 508 compliant, so that will save you time and hopefully money if you use them. Next slide, please.

Deb Curtis

All right, so in this part of the presentation, we're going to go through the required sections of the conops.

Deb Curtis

We're not going to go through them all, but we will highlight certain subsections that are particularly important and provide examples.

Deb Curtis

For you, we recommend that you follow along with the template and you take notes as we go.

Deb Curtis

Next slide please.

Deb Curtis

So, the purpose of a conops document is to describe the system characteristics of the two B deployed system from the viewpoint of the system users.

Deb Curtis

The first section of this document includes the background of the project, a document overview, and a system overview.

Deb Curtis

When preparing this section, the background section 1.1 will define the overall goals and intended outcomes for a defined underserved population or community. The document overview will outline the remaining sections of the document. The systems.

Deb Curtis

Overview Section will briefly define the system to be built and describe the parts of the system and how they integrate at a high level.

Deb Curtis

For this document you will use a context diagram to illustrate these relationships.

Deb Curtis

Next slide please.

Deb Curtis

So here we see an example of a context diagram that's used to describe a deployment system to provide a mobility service integrated with the payment system through a user's mobile phone.

Deb Curtis

This diagram illustrates the communication or relationship between all the devices and services within the deployment system at a high level.

Deb Curtis

Note that we don't go into detail on what the payment service is or how it works.

Deb Curtis

We don't necessarily talk about what an end user device is, although pictorially, we have noted that it may be a mobile phone, so we're keeping it at a high level here and here.

Deb Curtis

We see not only the product, but the infrastructure.

Deb Curtis

The public or government systems.

Deb Curtis

The edge and core devices and the third-party devices that are all part of the system.

Deb Curtis

Next slide, please.

Deb Curtis

So, as you see, we.

Deb Curtis

Skipped Section 2 but confection two is just reference document, so we don't really need to discuss it here, so we're going to go into Section 3.

Deb Curtis

In Section 3, the Conops document will focus on describing the current system and situation that your deployment plans to improve.

Deb Curtis

It helps the readers.

Deb Curtis

Of the document to understand how agencies currently operate and any operational challenges.

Deb Curtis

That they may have.

Deb Curtis

We're going to break it down a little further and we'll go over each of the sections 3.2 to 3.6 over the following slides. Next slide, please.

Deb Curtis

So.

Deb Curtis

When describing the current system, you need to include a few things, the operational environment and its characteristics.

Deb Curtis

It's important to set the stage the major system components and the interaction among those components.

Deb Curtis

You have to know what needs to be included in your system.

Deb Curtis

Then the interfaces to external systems or procedures.

Deb Curtis

There are things that are outside your control, but you need to know how they expect data, how you can expect data from them, and how you interface with those systems to make them part of your solution.

Deb Curtis

The capabilities, functions, and features of the current system.

Deb Curtis

Again, it's important to baseline.

Deb Curtis

And then a context diagram of the existing system depicting the boundaries, inputs, outputs and data flows of the system. This is a more in-depth version of the diagram that we just talked about in section 1.3 of this document. We also need to document the operational environment and procedures.

Deb Curtis

Including the facilities, equipment, personnel, risks, costs and other description of how the system operate.

Deb Curtis

We also need to document performance characteristics such as speed, throughput, volume, frequency, those sorts of things.

Deb Curtis

And the quality attributes such as availability, correctness, efficiency, expandability, flexibility, interoperability, maintainability, portability, reliability, re usability, support abilities.

Deb Curtis

Survivability, usability and all the other abilities that we can think of out.

Deb Curtis

There are attributes that we should document here.

Deb Curtis

And then finally we should also document the requirements for safety, security, privacy, integrity and continuity of operations.

Deb Curtis

In case of an emergency.

Deb Curtis

So, what should you?

Deb Curtis

Do if your deployment is creating a new system and you don't have a baseline to refer to, well, then you should use this section to describe the environment where the new system will take place and why.

Deb Curtis

It's important that this system is implemented.

Deb Curtis

Next, slide please.

Deb Curtis

So, this is an example of a more detailed context diagram, so when you compare it to the high-level context diagram, this has a lot more details on each subsystem. The high-level diagram is broken down to a further level of detail than in Section 1.3.

Deb Curtis

And would be broken down even further again in Section 5.

Deb Curtis

Of this document.

Deb Curtis

As an example, the core devices that were listed in Section 1.3 where machine learning and AI analysis machine, a TMC an web application.

Deb Curtis

Here we see that these core devices now have sub levels, so you know we're talking about the end user device where it was just end user device before now, we see it can be a smartphone application, a wearable technology, a browser-based application, or other sorts of things.

Deb Curtis

We see that the travel Traffic Management Center now talks about traveler information systems in.

Deb Curtis

Urgency management public safety, weather systems, ET cetera. These are further levels of detail than we had prior in the context diagram in Section 1.3. Next slide, please.

Deb Curtis

It's also important to identify all the stakeholders involved in the current system, and we don't mean individual people necessarily here, but groups of stakeholders that represent all of your users.

Deb Curtis

This includes, but is not limited to, transit agencies.

Deb Curtis

DOT End user's municipal services. Private sector stakeholders such as third-party data providers. Mobility services, system operators, and even rate maintenance personnel.

Deb Curtis

Once all of the stakeholders have been identified in the system, remember it's very important to map their roles and their responsibilities to the current system.

Deb Curtis

Why are they considered a user?

Deb Curtis

Why are they considered a stakeholder?

Deb Curtis

What is their role in that system?

Deb Curtis

Next slide, please.

So.

Deb Curtis

In section 3.4, we'll describe this support concepts and the environment, such as the systems, the assets, the capabilities for the current system.

Deb Curtis

Typical support systems are communication networks like Wi-Fi or LTE. 5G cellular services, maintenance and support facilities such as system monitoring.

Deb Curtis

Enterprise technology services, like cloud services, security network monitoring and finally other support tools and resources or systems such as ITS systems, power systems, monitoring systems, geographic information systems, or.

Deb Curtis

Other sorts of.

OK.

Deb Curtis

So, it's important here to document all of the systems that will be supporting the system you're developing.

Deb Curtis

Next slide, please.

Deb Curtis

This section is pretty straightforward, so here you'll describe all the modes of operation in your current system.

Deb Curtis

At a minimum, the section should cover normal degraded and failure mode, as defined here on the slide.

Deb Curtis

These modes could encompass several operational or management cases.

Deb Curtis

Under normal or adverse conditions.

Deb Curtis

These met modes may also be different for different subsystems or components.

Deb Curtis

For example, the failure in degraded mode for an automated vehicle will be much different than the failure in degraded mode for a back-end software system.

Deb Curtis

Next slide, please.

Deb Curtis

In this section, we're going to talk about operational policies and those are predetermined management decisions regarding the operations of the current system.

Deb Curtis

When providing these policies, please remember that local laws and regulations may apply.

Deb Curtis

For example, does your locality or state allow for automated vehicles on the road?

Deb Curtis

Does your state or locality have unique Accessibility requirements?

Deb Curtis

And similarly, constraints are predetermined conditions or requirements that are placed on your system.

Deb Curtis

The use of older equipment might constrain the interface to that equipment to a specific technology or protocol.

Deb Curtis

The environment that equipment might be deployed in might have a specific size, weight, or environmental constraint associated with it.

Deb Curtis

You can only put so much weight on a mast arm.

Deb Curtis

You only have so much space in a traffic signal controller cabinet, you have to have things be you know, waterproof.

Deb Curtis

If they're outside those sorts of things.

Deb Curtis

For the conops.

Deb Curtis

It's acceptable to list these policies and constraints at a high level.

Deb Curtis

You will be documenting them.

Deb Curtis

Further, in the system requirements document later in the process.

Deb Curtis

Next slide, please.

Deb Curtis

So, over the next.

Deb Curtis

Few slides we're going to focus on section four of the conops, and this is where you will describe the shortcomings of the current system as depicted by your system stakeholders.

Deb Curtis

These shortcomings are then used for the justifications of the new system.

Deb Curtis

This section will help you bridge the gap between Section 3, the current system and Section 5.

Deb Curtis

Your proposed new system.

Deb Curtis

So, remember here to follow.

Deb Curtis

The user needs identification process.

Deb Curtis

That you created in task one be the UNIRP.

Deb Curtis

That's why you did it.

Deb Curtis

Next slide, please.

Deb Curtis

So, when preparing section 4.1, there are two main points that it's very important to remember. One is providing the user needs, missions, objectives etc. will be new or modified in the system.

Deb Curtis

What current deficiencies or limitations prevent the system from responding to new or modified changes in the system?

Deb Curtis

And Secondly provide the why WHI is a new system should be developed to meet the needs described?

Deb Curtis

New systems should be developed to meet needs by describing the rationale behind the proposed system.

Deb Curtis

Next slide, please.

Deb Curtis

So, in this section we're going to talk about a description of the desired changes.

Deb Curtis

So, by capturing the user the user needs for the new system, you'll be providing your readers with a description of the desired changes.

Deb Curtis

So, let's discuss what makes a well written user need.

Deb Curtis

A well written user needs to be unique, uniquely identifiable.

Deb Curtis

It has to be identified with a unique number Anna title and you'll see in a bit why it's so important because we're going to be referring to those and we need to make sure that we can identify the exact user need.

Deb Curtis

That we are discussing can't be ambiguous here.

Deb Curtis

The second is a major desired capability.

Deb Curtis

Each need needs to express a major desired capability in the system, and this is regardless of whether the capability exists in the current system or you're identifying a gap.

Deb Curtis

You have to be able to tell.

Deb Curtis

In document and explain what it is that you desire to do, what capability that you need either to modify or to add to the system.

Deb Curtis

Then a well written user need needs to be solution free.

Deb Curtis

We talked about the what and we talked about the why, but we do not talk about the how.

Deb Curtis

There is no need to get into that here because you don't want to constrain the flexibility and the latitude that you're giving to the designers of the new system.

Deb Curtis

To produce the best feasible solution.

Deb Curtis

And Lastly, we need a well written user.

Deb Curtis

Need needs to capture the rationale and that's why what is your intent?

Deb Curtis

The why question comes in here about.

Deb Curtis

It you know, is this really needed?

Deb Curtis

Yes, it is.

Deb Curtis

And here is why.

Deb Curtis

So, remember that user needs should be high level and not provide a solution when you create your requirements your system requirements the user needs will be broken down even further into technical detail.

Deb Curtis

We don't need to get into that here.

Deb Curtis

Next slide please.

Deb Curtis

So, this is an example of a user need.

Deb Curtis

And we have identified each of the four criteria we just talked about here. Within this user need. So, we have a numbering scheme. 2.6 point 2.1 that's a unique identifier we can refer back to that and everybody is going to know and refer back to the exact same user need.

Deb Curtis

By using that unique identifier, but we also have a descriptor of transferring from subway platform to other modes.

Deb Curtis

That's what our user need is here and then our major desired capability takes it a little bit further and says transferring from the subway platform to a shared use service boarding location.

Deb Curtis

Transit users need to navigate from the subway platform to the shared services hailing location.

Deb Curtis

This is the capability I need to be able to get from the subway to a shared use location.

Deb Curtis

And then a rationale and why?

Deb Curtis

Why do we need to do that?

Deb Curtis

We need to do that in order to allow users to transition between modes and continue on their trip.

Deb Curtis

But again, as you notice, we haven't said how we're going to do that.

Deb Curtis

I think that that that's very important.

Deb Curtis

You don't want to artificially limit the potential solutions at this point in your development.

Deb Curtis

Next slide, please.

Deb Curtis

But to take things one step further, let's look at a parent child user need relationship. So, in the previous example 2.6 point 2.1, well now we've added another .1 to that. So, two-point, 6.2 point 1.1.

Deb Curtis

And here.

Deb Curtis

The unique identifier is accurate positioning inside buildings, so the desired capability is for transit.

Deb Curtis

Users with disability needs to be able to accurately locate their position within buildings.

Deb Curtis

That's what we want them to be able to do to accurately locate their position within buildings.

Deb Curtis

Big rationale is in order to navigate through a transit system and determine their exact location in the environment.

Deb Curtis

This feeds back into their ability to get from the subway platform to the bike sharing hailing location.

Deb Curtis

They need to be able to locate their position within the building to be able to navigate it.

Deb Curtis

So, as you can see, this builds off of and gives more detail than the previous exam.

Deb Curtis

Apple.

Deb Curtis

I'm going to second child relationship would be precise location inside the buildings, so transit users with disabilities need to be able to precisely locate their position with respect to other features such as doorways and escalators, and this allows them to navigate through the transit station.

Deb Curtis

And identify building features and points of interest.

Deb Curtis

So, this gets a little bit more detailed about how they get from the transit platform.

Deb Curtis

To the ride sharing ride.

Deb Curtis

Hailing ride sharing location but we're still not we're still not discussing exactly how they go about doing that.

Deb Curtis

Is it wayfinding?

Deb Curtis

Is it GPS?

Deb Curtis

We haven't gotten into a solution here.

Deb Curtis

We're still solution three.

Deb Curtis

We're just refining what navigation means.

Deb Curtis

So, this is a parent child relationship.

Deb Curtis

As you see the parent user example in the previous slide now has two child user needs that are more specific but still feed back up into that main user.

Deb Curtis

Need next slide please.

Deb Curtis

So, as you might imagine, if we go through this in this level of detail that we just talked about in the previous three examples for each user need that is identified for a highly complex system, we can end up with a lot of user needs.

Deb Curtis

So, we need.

Deb Curtis

A hierarchy or a way to prioritize.

Deb Curtis

These user needs so.

Deb Curtis

We have identified three different classifications and each user needs to be categorized in one of these three ways.

Deb Curtis

And those are essential needs and those needs that shall be provided by the new system.

Deb Curtis

And if you've had any experience with regulatory and drafting, and you know a shell is a must statement, so these are essential.

Deb Curtis

These are shells.

Deb Curtis

A desirable need is needs that should be provided by the new system.

Deb Curtis

They would do us a lot of good, but they're not quite at the level of mandatory essential shell.

Deb Curtis

There should.

Deb Curtis

And then we talk about operational needs and these are needs that might be provided by the new system.

Deb Curtis

And you know these are nice to have if we can get their sort of bonus features if you will.

Deb Curtis

Still, user needs, but they're not at the level of mission critical for the system to operate.

Deb Curtis

It's also important in this section to understand that we should be giving a justification as to why a need falls within the given category.

Deb Curtis

And that's going to be important during your walk through because yours, different stakeholders may have very different opinions on which classification a user need falls into, and you would have a discussion on that.

Deb Curtis

During your walkthrough, so it's important to document your justification as a baseline for those discussions to happen.

Deb Curtis

Next slide, please.

Deb Curtis

So, Section 4 talks about changes that you've considered, but you didn't include here.

Deb Curtis

Any user needs features or use cases that you considered for the deployment, but ultimately decided not to include should be provided in this section here.

Deb Curtis

You should include any information or analysis for.

Deb Curtis

Each as to why they were not included, whether it's budget, time, scope or whatever your conops is, your foundation and things may change.

Deb Curtis

So, it's important.

Deb Curtis

To capture the entire picture, including the pieces you chose not to include next slide, please.

Deb Curtis

So here you should focus on the assumptions or the constraints that would be that would directly impact the functionality of any part of your system.

Deb Curtis

Assumptions may be conditions which are accepted to be true.

Deb Curtis

And for example, the system needs to double capacity in two years that you know the system needs to provide X number of.

Deb Curtis

What you know widgets.

Deb Curtis

Whatever your assumption, maybe it's important for you to document it here, because, again, different stakeholder groups have very different assumptions.

Deb Curtis

And again, on the flip side.

Deb Curtis

Constraints are external requirements, limits, or other factors that may impact the development or the operation of your system.

Deb Curtis

So, it's important to document those just in case those constraints may change, or there may be a misunderstanding about the constraint.

Deb Curtis

So, it's important to document what you feel the constraints are.

Deb Curtis

So, they can be verified, and these assumptions and constraints can include things like standards, rules, regulations, or processes that the transportation system.

Deb Curtis

This time must comply with next slide, please.

Deb Curtis

So, moving on to Section 5, which is the concepts for the proposed system.

Deb Curtis

We talked in Section 3.

Deb Curtis

About what the existing system would look like, and this is our opportunity to document the same group of items, the same list of attributes for your proposed system.

Deb Curtis

So, this is the same structure as we used in Section 3.

Deb Curtis

However, will be talking about the proposed system here, so again, we're going to talk about a background in a scope, a description of your current systems and situation, your stakeholders for your proposed system, that may be different than the stake holders for your current system, your support environment, your modes of operation for your proposed system.

Deb Curtis

And really, operational policies and constraints.

Deb Curtis

And we'll go into more detail on each of these in the next slides.

Deb Curtis

Next slide, please.

Deb Curtis

So, while describing all.

Deb Curtis

The aspects of the system, including the ones listed on this slide break the system down into high level subsystems.

Deb Curtis

Include.

Deb Curtis

A subsystem is a self-contained system within the larger system provides, like, for example, you know within the context diagram that we used.

Deb Curtis

Earlier, the smartphone is a subsystem of your system of interest.

Deb Curtis

Next slide, please.

Deb Curtis

In this section, you're going to identify all your stakeholders.

Deb Curtis

And again, this doesn't necessarily have to get down to an individual specific person level, but your stakeholders can be transit agencies, DRTS end users, municipal services, private sector stakeholders, mobility services and.

Deb Curtis

Actors or use user classes of your proposed system.

Deb Curtis

So.

Deb Curtis

User classes are groups of users that interact with the system, and you should describe how they interact with the system and then define what class they are.

Deb Curtis

So, for example, user classes can be things can be identified as end users or operators, or policymakers.

Deb Curtis

A group of users that have a COM.

Deb Curtis

Then

Deb Curtis

Then

Deb Curtis

Deb Curtis

Interest and a common way of viewing your system so this section should describe all the roles of the users and users may have multiple roles and then identify stakeholders that do not directly impact the system but will somehow indirectly impact the system.

Deb Curtis

An example of this would be a policy maker.

Deb Curtis

They may not use your system, but the policies they implement have a direct impact on the system you're designing.

Deb Curtis

Next, slide, please.

Deb Curtis

Section 6 is.

Deb Curtis

Operational scenarios and these are really important.

Deb Curtis

Because operational scenarios or use cases can be the most valuable resource for a project to depict how the proposed system will operate.

Deb Curtis

They should be easy to follow and understand, allowing all stakeholders to grasp the concept of the proposed system.

Deb Curtis

They're particularly valuable when you're describing the system to non-technical stakeholders or end users that should be able to easily place themselves within the proposed system.

Deb Curtis

They should know from your operational scenario where they fit into the picture you have drawn.

Deb Curtis

Next slide, please.

Deb Curtis

So, we're going to go over an example of an operational scenario, just to give you a high-level introduction of what you know.

Deb Curtis

A use case could be.

Deb Curtis

So, in this use case, the user disembarks from the subway, enters an underground transit station where there's little no GPS.

Deb Curtis

The user needs help with localization and navigation.

Deb Curtis

Through the underground transit station to the exit.

Deb Curtis

Upon exiting the subway station, the user must locate and the pay station, and then locate a ridesharing service to complete the final leg of.

Deb Curtis

Their trip so.

Deb Curtis

The situation where someone comes in on the subway needs to get out of the subway station and needs to get to a ridesharing service to finish out their trip.

Deb Curtis

That's sounds fairly straightforward, but we know that that's pretty complex.

Deb Curtis

Fairly straight.

Deb Curtis

So, let's break it down into the goal.

Deb Curtis

What's the goal?

Deb Curtis

The goal of this use case is to illustrate and illustrates the right word because we're going to do it pictorially how integrating deployment solutions across multiple trick trip segments such as navigation vehicles, mode transfers, payment stop station.

Deb Curtis

And connecting other and complete trip segments can be obtained to allow a traveler's seamless transaction now or transition.

Deb Curtis

That's a lot to get to a seamless transition, but you know, it also illustrates how the enabling components can be a technology or service and how they all work together.

Deb Curtis

Next slide, please.

Deb Curtis

So, we talked a little bit about constraints, and you know.

Deb Curtis

A significant constraint on this particular use case for all underserved populations is the lack of positional accuracy when the user is underground.

Deb Curtis

It's a problem for everybody, but it's a particular problem in this use case because it's a constraint that would keep us from being able to.

Deb Curtis

To finish out the this, we won't be able this operational stress scenario won't be operational if we don't have this, so it's in very significant constraint and so another aspect of constraint for underserved populations is the need for each solution to be integrated across each track segment.

Deb Curtis

That's very complex, and there's also constraints that should be considered for underserved populations.

Deb Curtis

You know.

Deb Curtis

Like, particularly in particular, individuals with visual impairments, they may need additional assistance and a visual solution may not be sufficient, like signs or something like that, and individuals with mobility impairment.

Deb Curtis

We need specific routes in the facility, such as using elevators instead of escalators, and the intended user's ability to perform the actions also must be considered if there's cognitive function issues and that sort of thing so.

Deb Curtis

We also have to define the geographic scope of this because this is a scenario and so here our geographic scope will be the underground transportation facility.

Deb Curtis

With multiple tracks, subways, escalators, elevators, lateral limited lateral space, you know long corridors and you know Accessibility features may be limited.

Deb Curtis

GPS and phone signals are weak and the facilities you know may be very crowded and subject to a lot of traffic, so that's our geographic scope of this.

Deb Curtis

Next slide, please.

Deb Curtis

And then Lastly, we need to define our actors.

Deb Curtis

And you know, actors are stakeholders that will be involved in this use case, and that's everything from applications to ridesharing services.

Deb Curtis

You know?

Deb Curtis

And you know smartphone devices and Bluetooth beacons.

Deb Curtis

And the transit agency and the underserved population user traveler themselves.

Deb Curtis

So, there's a lot of.

Deb Curtis

Factors that come into this one what appears to be simple operational scenario.

Deb Curtis

Next slide please.

Deb Curtis

And this is an illustration of that scenario.

Deb Curtis

Yeah, being able to visualize the interfaces and the connections that that need to happen are important, and so over the next two slides we're going to see a detailed flow of the operational scenario along with alternative flows.

Deb Curtis

That you might see noted here in what's designated for A at the top of the illustration.

Deb Curtis

Next slide, please.

Deb Curtis

So here we have some pre considered preconditions.

Deb Curtis

The underground facility has Bluetooth enabled Beacons placed throughout the facility to provide location and navigation information.

Deb Curtis

OK so that's that will help with our navigation and our lack of signal.

Deb Curtis

And in a pre-condition, there are any conditions that allow a user to arrive at the scenario being described.

Deb Curtis

And.

Deb Curtis

That should be explained.

Deb Curtis

So, if you don't explain that you have these Bluetooth beacons, then it's going to be questioned how the previous operational scenario is possible.

Deb Curtis

Because you've already noted a constraint being limited navigational signals within the underground structure.

Deb Curtis

So then next you should name flow, and this is a detailed step by step walk through the use case or the scenarios the user did.

Deb Curtis

Some barks there's API access, you use GPS provided by the Beacons.

Deb Curtis

You approach the pay station, you exit.

Deb Curtis

The underground facility was a lot more details, so this main flow walks you through exactly what needs to happen for this operational scenario.

Deb Curtis

To be to take place and be successful next slide please.

Deb Curtis

But there's not always just one way to do things, so an alternate flow will describe any alternates to the main path of the use case or their optional or additional methods of communication.

Deb Curtis

Could a user choose to move the scenario into a different flow?

Deb Curtis

Here instead of, you know an API providing a path to the nearest exit.

Deb Curtis

They could call an Accessibility service or a human helper to help them navigate through the underground station, and that would be an alternate flow to the main flow of this particular use case.

Deb Curtis

And then we'll talk about post conditions.

Deb Curtis

What is?

Deb Curtis

The end state.

Deb Curtis

Of this use case, and so in in this particular example, we've noted that maybe the user's phone alerts a Guardian or caretaker to let them know that the trip was successful, or if the user has traveled.

Deb Curtis

You know the predetermined route or kind of gone off course.

Deb Curtis

And then we talk about information requirements because we talked, you know, a lot about these interfaces with these systems and a lot of these interfaces.

Deb Curtis

Consist of information sharing.

Deb Curtis

So what information is needed for the use case to be completed successfully?

Deb Curtis

Well, you need location.

Deb Curtis

You need status, preferred routes, payment preferences, traveler information, advisories, route detours.

Deb Curtis

Maintenance elevator out of service type of thing.

Deb Curtis

So, these are all information requirements to make our operational scenarios successful.

Deb Curtis

And finally, getting back to why I stressed that your user needs need to be uniquely identifiable.

Deb Curtis

Well, here is our first example of listing user needs that these use case needs to make here, and each one of these are identified by that unique.

Deb Curtis

Numerical identifier, as well as its title.

Deb Curtis

That allows us to go back to the precise user, need that we are referencing here without ambiguity.

Deb Curtis

Without someone misinterpreting, I meant this one.

Deb Curtis

You meant that one I thought you meant this one over here.

Deb Curtis

This allows us to very specifically and very accurately identify the related user needs for.

Deb Curtis

Each of these operational scenarios.

Deb Curtis

So, this is why it's so important to have that uniquely identifiable number or title, and this also provides traceability.

Deb Curtis

We can trace back to the exact requirement the exact user need.

Deb Curtis

Next slide, please.

Deb Curtis

So, after we've gone through all that.

Deb Curtis

Section 7 is the summary of the impacts and there are multiple different types of impacts that the new system has on the users, the developers, maintainers, or other stakeholders within the project, and those are operational impacts.

Deb Curtis

Which described the in detail, the impacts on each user group.

Deb Curtis

How does this impact each of the user groups that we had identified?

Deb Curtis

And then organizational impacts.

Deb Curtis

And these will describe and focus on impacts to specific organizations or agencies.

Deb Curtis

Dhotis transit agencies.

Deb Curtis

ETC and then finally impacts during development.

Deb Curtis

This will describe the impacts that are anticipated during the development of the new system.

Deb Curtis

Are you taking another system offline or are you deprecating a service that's currently being provided?

Deb Curtis

So, remember, by the end of this section.

Deb Curtis

Every involved agency, organization, or user should have a sense of the impact of the new system on them and allow them to do the necessary planning and preparation for the new system to be implemented.

Deb Curtis

Next slide please.

Deb Curtis

And finally, Section 8 Section 8 will provide an analysis of the benefits, limitations, advantages, disadvantages and alternatives and tradeoffs that were considered for this proposed system.

Deb Curtis

Here you should include a brief analysis of the alternatives you considered at the conops phase of the project.

Deb Curtis

They are not part of the project. This section should build off of section 4.4 and discuss the tradeoffs and document the decisions that you made for each alternative. Remember, this is a foundation you know the document may change based on your user needs. Your conops walkthrough.

Deb Curtis

And may even change further down the line during your requirements or system design.

Deb Curtis

So, it's important to document the entire picture of why you chose the solution you did and how you arrived there to allow you to be able to remember and to know all that when you go back or may go back during previous or subsequent phases of the project.

Deb Curtis

Next slide, please.

Deb Curtis

So, the next slides we're going to provide an overview of the conops walk through and what you should expect from that next slide, please.

Deb Curtis

So, the Contacts walk.

Deb Curtis

Through has been an event that is critically important to pass systems engineering efforts.

Deb Curtis

This process has been employed across the CD pilot technical roundtables, as well as all the federally funded I TS standards development efforts.

Deb Curtis

Having participation from a diverse set of stakeholder groups is critically important to ensuring that you have actually accurately captured your user needs.

Deb Curtis

We build the more critical pieces of the conops.

Deb Curtis

In this case the system context diagrams use cases and user needs is the main activity to accomplish during your walk through the hope with these reviews is to spark discussions between the different stakeholder groups.

Deb Curtis

About the intent and the clarity of these elements.

Deb Curtis

As an example, a municipal organization that maintains pedestrian pathways may interpret user need related to the maintenance notifications very differently than the application developer trying to implement those notifications.

Deb Curtis

Into an application.

Deb Curtis

So, the key point here to remember is.

Deb Curtis

Discussion is a very good thing, and if you have, you know the right stakeholders at the table.

Deb Curtis

You should have a fairly robust discussion that will allow you to view different perspectives and different views of your system in a completely different way.

Deb Curtis

And that's good because.

Deb Curtis

That's how your stakeholder groups are going to be looking at your system as well.

Deb Curtis

Next slide, please.

Deb Curtis

So, we realized that this is a big-time commitment for everyone.

Deb Curtis

The conops walkthrough briefing decks should include detailed agendas for when specific sections of use cases and user needs will be reviewed.

Deb Curtis

If there are concerns about some stakeholders being able to accommodate the full walkthrough.

Deb Curtis

It's perfectly acceptable to schedule specific sections of user needs or requirements for specific times to accommodate those stakeholders.

Deb Curtis

There's.

Deb Curtis

The Contacts Comment Resolution report is where you will capture the discussions that arise from the review and the changes that result from those discussions from past experience.

Deb Curtis

The vast majority of participants in these walkthroughs have felt that discussions were that were generated and the issues that were resolved.

Deb Curtis

They are incredibly valuable and contributed to the overall success of the project.

Deb Curtis

Next slide, please.

Deb Curtis

So, the next slide will provide some useful resources, and these are also located at the end of the conops template.

Deb Curtis

Next slide, please.

Deb Curtis

You've seen these before but will show them again.

Deb Curtis

This slide provides key references to help with the writing of the Conops.

Deb Curtis

There are two groups of resources identified here.

Deb Curtis

The IEEE resources list consists of standards that provide guidance about systems engineering.

Deb Curtis

Documents such as the conops that you're preparing here.

Deb Curtis

These standards, however, must be purchased.

Deb Curtis

And then the second list of Group of requirement or Group of resources is the FHWA systems engineering resources lists and this is a list of Federal Highway developed documents that provide again, guidance and important information about the systems engineering principles and approaches including agile development.

Deb Curtis

Next slide, please.

Deb Curtis

So, for more information please feel free to contact our program manager Elina Zlotchenko or myself.

Deb Curtis

Your systems engineering, federal lead and Please remember that it is important and imperative for you to copy your site lead and your core on any correspondence that you send to us.

Deb Curtis

And you can also feel free to visit the complete Trip website with FAQ and other documents available.

Deb Curtis

For your use.

Deb Curtis

Next slide, please.

Deb Curtis

Alright, so we're at the end of my presentation and I think it's time for questions.

Deb Curtis

Thank you.